

WE CLAIM:

1. A method for correcting the range and deflection errors in an unguided spin or fin stabilized projectile, comprising:
 - determining deviations of the projectile from a ballistic trajectory in a downrange dimension and a crossrange dimension; and
 - 5 intermittently deploying and stowing at least one aerodynamic surface to develop a rotational moment, which creates body lift that nudges the projectile in said crossrange and downrange dimensions to move the projectile to its ballistic trajectory.
2. The method of claim 1, wherein the aerodynamic surface is deployed and stowed in a partial roll cycle of the projectile.
3. The method of claim 2, wherein the aerodynamic surface is deployed and stowed over multiple partial roll cycles.
4. The method of claim 1, wherein the projectile has a low spin rate so that the body lift nudges the projectile in said crossrange and downrange dimensions in the same plane as the average rotational moment created by the deployment of the aerodynamic surface.
5. The method of claim 1, wherein the projectile has a high spin rate so that the body precesses in said crossrange and downrange dimension in a plane orthogonal to the average rotation moment created by the deployment of the aerodynamic surface.
6. The method of claim 1, further comprising:
 - launching the spin stabilized projectile on the ballistic trajectory according to a firing table for the same unguided projectile.
7. The method of claim 1, wherein the aerodynamic surface has no effect on the ballistic trajectory of the projectile when stowed.

8. The method of claim 1, wherein the aerodynamic surface is deployed at a fixed angle of attack.
9. The method of claim 1, wherein the aerodynamic surface is moved between a fully deployed position and a stowed position.
10. The method of claim 1, wherein the determination of deviations from the ballistic trajectory and the intermittent deployment of the aerodynamic surface are continuous-to-target.
11. The method of claim 1, wherein the determination of deviations from the ballistic trajectory and the intermittent deployment of the aerodynamic surface are windowed-to-target.
12. The method of claim 10, wherein the aerodynamic surface is intermittently deployed in a first window soon after launch to correct for deviations in the crossrange dimension, in a second window soon after the projectile passes apogee to correct for deviations in the downrange dimension, and in a third window at a time-to-target to
5 correct for deviations in the crossrange and downrange dimensions.
13. The method of claim 1, wherein the aerodynamic surface is deployed and stowed by energizing a voice coil.
14. A 2-D corrector for correcting the range and deflection errors in an unguided spin or fin stabilized projectile, comprising:
 - at least one aerodynamic surface on the projectile moveable between stowed and deployed positions;
 - 5 a deployment mechanism for moving the aerodynamic surface between said stowed and deployed positions;
 - a receiver for receiving the position of the projectile; and
 - a flight computer that determines deviations from a ballistic trajectory in a

downrange dimension and a crossrange dimension and controls the deployment
10 mechanism to intermittently deploy the at least one aerodynamic surface to develop a
rotational moment, which creates body lift that nudges the projectile in said crossrange
and downrange dimensions to move the projectile to its ballistic trajectory.

15. The 2-D corrector of claim 14, wherein said at least one aerodynamic surface
includes a pair of pivot mounted canards.

16. The 2-D corrector of claim 14, wherein the aerodynamic surface has no effect on
the ballistic trajectory of the projectile when stowed.

17. The 2-D corrector of claim 14, wherein the aerodynamic surface is deployed at a
fixed angle of attack.

18. The 2-D corrector of claim 14, wherein the aerodynamic surface is moved
between a fully deployed position and a stowed position.

19. The 2-D corrector of claim 14, wherein the deployment mechanism comprises:
A voice coil, and
A permanent magnet on each of said at least one aerodynamic surface.

20. The 2-D corrector of claim 19, wherein the deployment mechanism further
comprises a centripetal spring that substantially offsets a centrifugal force on the
aerodynamic surface caused by the rotation of the projectile.

21. The 2-D corrector of claim 20, wherein the deployment mechanism further
comprises a deployment spring that is unlocked if the rotation of the projectile falls
below a predetermined rate to partially offset the centripetal spring force.

22. The 2-D corrector of claim 14, wherein the aerodynamic surface, deployment
mechanism, receiver and flight computer are integrated in a fuze kit for use with a

projectile.

23. The 2-D corrector of claim 14, wherein the aerodynamic surface is deployed and stowed in a partial roll cycle of the projectile.

24. The 2-D corrector of claim 23, wherein the aerodynamic surface is deployed and stowed over multiple partial roll cycles.

25. The 2-D corrector of claim 14, wherein the projectile has a low spin rate so that the body lift nudges the projectile in said crossrange and downrange dimensions in the same plane as the average rotational moment created by the deployment of the aerodynamic surface.

26. The 2-D corrector of claim 14, wherein the projectile has a high spin rate so that the body precesses in said crossrange and downrange dimension in a plane orthogonal to the average rotation moment created by the deployment of the aerodynamic surface.

27. The 2-D corrector of claim 14, wherein the spin stabilized projectile is launched on the ballistic trajectory according to a firing table for the same unguided projectile.

28. The 2-D corrector of claim 14, wherein the flight computer determines deviations from the ballistic trajectory and the intermittent deployment of the aerodynamic surface continuous-to-target.

29. The 2-D corrector 14, wherein the flight computer determines deviations from the ballistic trajectory and the intermittent deployment of the aerodynamic surface windowed-to-target.

30. The 2-D corrector of claim 29, wherein the aerodynamic surface is intermittently deployed in a first window soon after launch to correct for deviations in the crossrange dimension, in a second window soon after the projectile passes apogee to correct for

deviations in the downrange dimension, and in a third window at a time-to-target to
5 correct for deviations in the crossrange and downrange dimensions.

31. A modified fuze kit for use with a spin or fin projectile, comprising:
a fuze kit;
at least one aerodynamic surface on the fuze kit moveable between stowed and
deployed positions;
5 a deployment mechanism for moving the aerodynamic surface between said
stowed and deployed positions;
a receiver for receiving the position of the projectile; and
a flight computer that determines deviations from a ballistic trajectory in a
downrange dimension and a crossrange dimension and controls the deployment
10 mechanism to intermittently deploy the at least one aerodynamic surface to develop a
rotational moment, which creates body lift that nudges the projectile in said crossrange
and downrange dimensions to move the projectile to its ballistic trajectory.

32. The modified fuze kit of claim 31, wherein the aerodynamic surface is deployed
at a fixed angle of attack.

33. The modified fuze kit of claim 31, wherein the deployment mechanism
comprises:
A voice coil, and
A permanent magnet on each of said at least one aerodynamic surface.

34. The modified fuze kit of claim 33, wherein the deployment mechanism further
comprises a centripetal spring that substantially offsets a centrifugal force on the
aerodynamic surface caused by the rotation of the projectile.

35. The modified fuze kit of claim 34, wherein the deployment mechanism further
comprises a deployment spring that is unlocked if the rotation of the projectile falls
below a predetermined rate to partially offset the centripetal spring force.

36. The modified fuze kit of claim 31, wherein the aerodynamic surface is deployed and stowed in a partial roll cycle of the projectile.
37. The modified fuze kit of claim 36, wherein the aerodynamic surface is deployed and stowed over multiple partial roll cycles.
38. The modified fuze kit of claim 31, wherein the projectile has a low spin rate so that the body lift nudges the projectile in said crossrange and downrange dimensions in the same plane as the average rotational moment created by the deployment of the aerodynamic surface.
39. The modified fuze kit of claim 31, wherein the projectile has a high spin rate so that the body precesses in said crossrange and downrange dimension in a plane orthogonal to the average rotation moment created by the deployment of the aerodynamic surface.
40. The modified fuze kit of claim 31, wherein the flight computer determines deviations from the ballistic trajectory and the intermittent deployment of the aerodynamic surface continuous-to-target.
41. The modified fuze kit of claim 31, wherein the flight computer determines deviations from the ballistic trajectory and the intermittent deployment of the aerodynamic surface windowed-to-target.
42. The modified fuze kit claim 41, wherein the aerodynamic surface is intermittently deployed in a first window soon after launch to correct for deviations in the crossrange dimension, in a second window soon after the projectile passes apogee to correct for deviations in the downrange dimension, and in a third window at a time-to-target to
5 correct for deviations in the crossrange and downrange dimensions.